Statistical hypothesis testing

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Steps:

- **Defining hypothesis**
- **Sampling**
- **Statistical inference**

Hypothesis:

A hypothesis is an assumption, an idea about something.

Exp)

- **Today is rainy**
- **I will receive full salary**
- **Ali will pass the exam**
- **5th of December is windy**

Statistical hypothesis:

Null Hypothesis H_0

Alternative Hypothesis H_1

$$\begin{cases} H_0: \text{ today is rainy} \\ H_1: today\ is\ not\ rainy \end{cases}$$

$$\begin{cases} H_0: \quad \text{I will receive } full\ salary \\ H_1: i\ will\ not\ receive\ full\ salary \end{cases}$$

Main hypothesis in statistics:

They are three generally:

$$\begin{cases} H_0 : \mu = \mu_0 \\ H_1 : \mu \neq \mu_0 \end{cases} + + + + + \begin{cases} H_0 : \mu > \mu_0 \\ H_1 : \mu \leq \mu_0 \end{cases} + + + + + + \begin{cases} H_0 : \mu < \mu_0 \\ H_1 : \mu \geq \mu_0 \end{cases}$$

Sampling and calculation

- Take a sample of size n
- Calculation of $\overline{X}$
- Calculation of S^2
- Finding the value of $t(n-1,\alpha)**or**t(n-1,\frac{\alpha}{2})$

Rejection and acceptance region by (1-alfa)% of confidence

$$\begin{cases} H_0: \mu = \mu_0 \\ H_1: \mu \neq \mu_0 \end{cases} \Rightarrow \bar{X} < \mu_0 - \frac{S}{\sqrt{n}} t(n-1; \frac{\alpha}{2}) ** or ** \bar{X} > \mu_0 + \frac{S}{\sqrt{n}} t$$

$$\begin{cases} H_0: \mu > \mu_0 \\ H_1: \mu \leq \mu_0 \end{cases} \Rightarrow \bar{X} < \mu_0 - \frac{S}{\sqrt{n}} t\left(n-1; \alpha\right)$$

$$\begin{cases} H_0: \mu < \mu_0 \\ H_1: \mu \geq \mu_0 \end{cases} \Rightarrow \bar{X} > \mu_0 + \frac{S}{\sqrt{n}} t\left(n-1; \alpha\right)$$

Example

I want to check whether the average age of the lecturers in Cihan is more than 30 or less than 30

$$\begin{cases} H_0: \mu > 30 \\ H_1: \mu \leq 30 \end{cases}$$

Thank you